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Professor Winnecke, at Bonn, on March 8, 1858. This comet was originally discovered by Pons, at Marseilles, on June 12, 1819. Since Oppalzer's death, Dr. Haerdtl of Vienna has taken up the orbit and discussed it, and also computed the perturbations the comet has experienced since last seen. The last return of the comet was in 1886, when it was discovered by Mr. Findlay, at the Cape of Good Hope, Aug. 20. At the time of discovery the comet had passed its perihelion, and was twelve days ahead of its predicted place. Its distance from the earth at the time of discovery was about one hundred and fifty million miles. In No. 3,062 of the *Astronomische Nachrichten* Dr. Haerdtl publishes an ephemeris to assist in finding the comet during its approaching return. The date of next perihelion passage is June 30, 1892. At the present time the comet is about two hundred and fifty millions of miles from the earth, and is of course beyond the reach of all but the most powerful telescopes, and probably even them. In the latter part of next January the comet should be within the reach of moderate-sized telescopes. A copy of the ephemeris will be published before that date.

The following are the positions for Wolf's comet for following dates. The epoch is for Greenwich midnight.

1891.	R. A.			Dec.	
	h.	m.	s.	°	'
Dec. 1.5	4	24	18	—13	22
3 5		23	4	13	43
5.5		21	52	14	0
7.5		20	45	14	15
9.5	4	19	42	—14	27

The eclipse of the moon on the night of the fifteenth of the present month was not generally observed at stations in the eastern portion of the United States, due to a very cloudy sky. The only satisfactory observations, as far as known, were those made at Harvard Observatory. It was cloudy at Albany, Rochester, Princeton, Washington, and the University of Virginia, points at which large telescopes are located. Professor Dölland, late of the observatory at Pulkova, Russia, had prepared a large list of stars that would be occulted during the eclipse. Preparation had been made at the several observatories mentioned to observe as many of these stars as possible, to assist in revising the present value of the semi-diameter of the moon.

#### FOREST AND MINERAL WEALTH OF BRAZIL.

A BULLETIN lately issued by the Bureau of the American Republics states that the inexhaustible forests of Brazil abound in woods of great value, some of the most beautiful and valuable being entirely unknown in Europe. The large collection of Brazilian woods exhibited in Philadelphia in 1876 attracted much attention, and the catalogue mentions 22,000 different woods found in the valley of the Amazon alone. The best known of the valuable woods among those of the Amazon are rosewood, satin wood, shell wood—of which latter beautiful shell-like articles are made. The cedars of Brazil are entirely different from the European, and they abound everywhere from north to south. During the floods of the Amazon, they are seen borne along by the current, as a writer on Brazil describes them, "mighty trunks of foliage like floating islands." Among the medicinal plants of the Amazon valley may be mentioned the sarsaparilla, ipecacuanha, the polycarp, the cubeb, the curare,—from which the Indians extract the poison for their arrows,—the *nux vomica*, etc. On the Atlantic coast, the variety

of valuable woods is continued, and mention may be made of the acapú and angelica, and the bacury, which is the building wood most in use in Maranhão.

The forests abound in plants producing textile fibres. A firm at Ceará has lately commenced the manufacture of the *gravatá* fibre, a plant belonging to the *bromeliacea*. The rubber tree exists in several varieties, producing as many different sorts of rubber, and all through the northern regions it thrives well. The once famous Brazil wood, which gave its name to the country, lost its importance with the discovery of the cheaper aniline dyes, and its exportation has dwindled to insignificance. Gutta-percha is produced in Brazil from two species of trees, the jaguá (*Lucuma gigantea*) and the massaranduba (*Mimusops elata*). The beautiful vinhatico, much employed in Brazil for furniture and cabinet work, enjoys a considerable reputation, the greater part of the furniture in Brazil being made either of rosewood or vinhatico. The beautiful shaded yellow of this latter makes it remarkable among the woods at once useful and ornamental.

The development of the vast mineral resources of Brazil, with the exception of gold and diamonds, has only just begun. Its deposits of coal and iron, laid bare by scientific explorers, await for the most part the labor and machinery necessary to utilize them. The existence in Brazil has been demonstrated of copper, manganese, and argentiferous lead ore, in considerable quantities, and in widely extended localities. There are also mines of iron, coal, gold, and diamonds. Gold is found in every State in Brazil, and is systematically mined in Minas Geraes, Rio Grande do Sul, Bahia, Matto Grosso, Parana, Sao Paulo, and Maranhão.

Diamonds are co-extensive with the gold-deposits, and, like that metal, are most abundant in Minas Geraes, where they have been found since 1789. The most important locality known for the production of these gems is the district of Diamantina, in the above-named State. They are found in Parana, in the gravels of the river Tibagy, and in the bed of streams dry during the summer. Since the discovery of diamonds at the Cape of Good Hope, the Brazilian production has greatly diminished.

As regards iron, the State of Minas Geraes abounds with it. It is not found in veins or strata, buried deep in the earth, but in enormous beds, often lying at the surface, or in mountain masses. These vast deposits are worked only by small scattered furnaces, charcoal being used in the reduction of the ore. Of these small furnaces there are five groups, producing about 3,000 tons annually, the product being used in the surrounding districts in the manufacture of articles of home consumption, such as hoes, shovels, picks, drills, nails, horseshoes, etc. In the State of San Paulo are found deposits similar to the best Norwegian ore; and one of the mines is worked by the Government establishment, near the village of Sorocaba. This establishment has two furnaces, and produced in one year about 790 tons of pig iron. The ore has about 67 per cent of iron. In Santa Caterina, not far from a harbor accessible to the largest vessels, are vast deposits of hematite, containing on an average 30 per cent of manganese, and 25 to 30 per cent of iron. In the State of Goyaz, as in Minas Geraes, are found enormous masses of the ore itaberrite.

The presence of copper has been demonstrated in Rio Grande do Sul, in Matto Grosso, in Minas Geraes, and Ceará. The ore has never yet been mined, but in the last named State works have been begun with a view to its extraction and reduction. The ore, as far as yet reached, yields 40 per

cent of copper. The deposits of lead so far discovered are few, but its presence has been determined in Rio Grande do Sul, Sao Paulo, and Minas Geraes, generally in connection with silver—argentiferous galena—and sometimes with gold. Bismuth and antimony are found in combination with ores of other metals, but not as yet in considerable quantities.

Up to the present, the deposits of coal discovered are not, relatively, so extensive as those of iron, but its presence has been determined in Sao Paulo where the borings indicated its existence in quantities and situations that render probable a profitable extraction. In Santa Caterina, in the valley of the Tubarao, bituminous coal exists, and a concession has been granted by the Government for working the beds. The State of Rio Grande do Sul appears to be the most favored in respect to coal deposits. In the Candiota basin, veins of coal crop out, of a thickness varying from four to six feet, but the only mines worked up to the present are those of Arroio dos Ratos, which supply coal to the steamers that ply on the river and to the Government railway.

Marbles are abundant and widely distributed; they are of various colors, and resist the disintegrating influences of the climate, under conditions destructive of the marble imported from Europe. In Rio Grande do Sul and Sao Paulo are various manufactures of works of marble. Important deposits of loadstone are found in Minas Geraes. In the State of Goyaz, in the Sierra dos Cristaes (Crystal Range) are found in abundance the well-known "Brazilian pebbles," whose pure quartz is employed in the manufacture of lenses and spectacles. They are found near the surface, usually covered with a coating of iron oxide. In the calcareous caverns of the San Francisco plateau and of the river Velhas, in Minas Geraes, saltpetre has for a long time been collected. One of these grottoes, near Diamantina, furnished within a few days after its discovery forty tons of the pure crystals. Graphite is also found in considerable quantities in Minas Geraes, one of the deposits yielding 83 per cent of carbon suitable for pencils.

#### THE CLIMATOLOGY OF BRAZIL.

A PAMPHLET by Sr. H. Morize, entitled "Esboço de uma Climatologia do Brazil," has been issued from the Observatory of Rio Janeiro. The author divides the country into three great zones—tropical, subtropical, and temperate. The first, in which the mean temperature exceeds 77° F., embraces the northern part of Brazil, and is bounded to the south by a line running along the south side of the State of Pernambuco, across Goyaz, and somewhat to the south of Cuyabá. The second lies between the isothermals of 77° and 68°, and extends into S. Paulo and Paraná, leaving a portion of these provinces, with Sta. Catharina and Rio Grande do Sul, to form the third zone, in which the mean temperature oscillates between 68° and 59°.

The tropical zone may be again divided into three regions, the Upper Amazons, Matto Grosso and the interior of the states on the Atlantic border, and the Littoral. On the Upper Amazons there are two rainy seasons, the principal one lasting from the end of February to June, and the other from the middle of October to the beginning of January. During the intervening dry season the rivers fall sometimes as much as 46 feet. Sr. J. Pinkas found that the mean temperature was 79°, but the maximum was 103°, which is comparatively low. The heat, however, was very oppressive, owing to the excessive moisture in the air. The prevailing wind blows

from the south-west, and is frequently interrupted by calms. Towards the end of the great rains the phenomenon known as *friagem* occurs, which is a sudden fall of temperature produced by an influx of cold air from the Andes. It can only take place on a calm day, and is preceded by a high temperature, an almost complete saturation of the air, and a barometric fall of about .2 inches.

In the second subdivision heavy rains occur in spring and summer, and the thermometer often rises as much as 35° in a few hours. These sudden changes are produced by the rapid alternations of north-west and south-east winds, the former warm and moist, the latter always very cold. Dr. Morsback gives the mean temperature as 79.25° F. The average rainfall is 45.9 inches, and the number of raining days 85. In this region also there is a period of *friagem*.

The third subdivision is characterized by rains in summer and autumn, and particularly during the month of April. The differences of temperature are much less than in the other subdivisions, 84° F. having been recorded at Vizeu in Pará during December, the warmest month, and 80° F. at the same hour, 9 A.M., during July, the coolest month. The mean rain-fall is about 58 inches. In the dry season the prairies are withered and scorched by the heat, and the cattle that feed on them suffer terribly. Occasionally the rains do not make their appearance at all, and then famine spreads throughout the country. This calamity has occurred six times already during the present century.

The subtropical zone closely resembles the warm regions of the south of Europe. Both the temperature and the rainfall vary considerably according to the situation. The climate of the third zone is one of the finest in the world, and therefore the States comprised in it have been almost exclusively chosen by European immigrants. The rainy season does not occur in the same months as in the other regions: rain falls chiefly in the winter and autumn. As the distance from the equator increases, the transition between the wet and dry seasons becomes less distinct. The meteorology of Sao Paulo and Rio Grande do Sul has already been noticed in the *Scottish Meteorological Journal* (vol vi., p. 332, and vol. vii., 536). Sr. Morize's paper is very useful for those who wish to study the subject minutely, for he has collected numerous records of observations from all parts of the country.

#### YEZO.

THE island of Yezo, or Hokkaido, has an area of about 30,500 square miles. Its population, said to have been 27,000 in 1869, was, in 1889, 254,805 (including the Kurile Islands), according to the Japanese census reports. The Government, according to the *Scottish Geographical Magazine*, is actively developing the country. It is constructing a net-work of roads by convict labor, and intends to form a new capital near the source of the river Ishikari. The plan provides for 17,472 colonists, besides 1,920 houses for Tonden-he. These latter are military colonists, each of whom receives a grant of about 8 acres of land and a house, on condition of serving in war up to the age of 40. Another town is to be founded on the Sarachi. A railway from Sapporo to Mororan has been proposed, the harbor at this place being more convenient than that of Orunai, where the coal of Yezo is now shipped. The dwellings of the inhabitants are by no means adapted to the rigor of the climate: those of the military colonists are slightly superior, and consist of two apartments. Cultivation and fishing are the chief occupations. Vegetables, millet, potatoes, wheat, barley, rice, and beet-root are culti-